Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
2000 Biennial Regulatory Review -- Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage by, Satellite Network Earth Stations and Space Stations	)	IB Docket No. 00-248

REPLY COMMENTS OF THE

SATELLITE INDUSTRY ASSOCIATION

April 8, 2003

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INTRODUCTION AND SUMMARY

The Satellite Industry Association ("SIA") hereby submits these Reply Comments in response to the comments filed concerning the Further Notice of Proposed Rulemaking issued in the above-captioned proceeding.[1] In particular, SIA responds herein to the comments filed by: (1) General Communication, Inc. ("GCI"); (2) Aloha Networks, Inc. ("Aloha Networks"); (3) QUALCOMM Incorporated ("Qualcomm"); and (4) Spacenet, Inc. and StarBand Communications, Inc. ("Spacenet/Starband"). These Reply Comments address the following issues:[2]

Routine licensing of C-band antennas. SIA proposed that the Commission license routinely C-band antennas as small as 2.4 meters, subject to: (1) limits on maximum power spectral density into the antenna flange; and (2) pointing accuracy requirements. GCI, on the other hand, proposed to limit routine licensing to C-band antennas that are 3.7 meters or larger. SIA opposes GCI's proposal because it is based on faulty technical assumptions and would stifle the development of new and innovative C-band services.

Contention protocols. SIA demonstrated in its initial comments that there is no need for the Commission to adopt regulations regarding contention protocols for FDMA, TDMA or CDMA. Hundreds of thousands of terminals using contention protocol techniques have been deployed without incident, and Aloha Networks' claim that interference will become an issue in the future is speculative and unsubstantiated. Aloha Networks' proposals for restricting the use of contention protocols, moreover, would unnecessarily limit the offered load of networks employing random access techniques and would threaten the viability of such networks.

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1 *See In the Matter of 2000 Biennial Regulatory Review--Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage by, Satellite Network Earth Stations and Space Stations*, Further Notice of Proposed Rulemaking, 17 FCC Rcd 18585 (2002) ("FNPRM").

2 SIA is not addressing herein the comments of Spacenet/Starband concerning the appropriate starting angle for routine processing of Ku-band antennas. These comments focused on SIA's prior proposal (filed November 5, 2001 and December 10, 2001) on the starting angle issue, which has been superseded by the proposal SIA made in response to the FNPRM (filed March 10, 2003).

SIA also opposes the statistical approach proposed by Qualcomm because it would place TDMA, FDMA, and non-random access CDMA systems at a disadvantage relative to contention protocol CDMA systems. Further, the lack of a time limit in Qualcomm's proposal means that a contention protocol CDMA system could have transmission collisions over the entire bandwidth for an unlimited duration. In addition to these defects, Qualcomm's proposal to extend its statistical approach to Ka-band networks also is unwarranted because it would impose additional regulations on the operation of Ka-band networks when they are first introduced without any basis for the new regulations.

If the Commission decides to adopt regulations regarding contention protocols notwithstanding the lack of a record to support such regulation, it should adopt the proposal made by SIA in its initial comments which conforms to the Commission's determination that the probability of collision in a VSAT network with 100 millisecond transmissions should be less than 1% and also provides additional flexibility for systems with bursts of duration less than 100 milliseconds. Alternatively, if the Commission proceeds to impose regulation regarding contention protocols, SIA would not object to the adoption of a modified version of the graduated approach advocated by Spacenet/Starband.

Pilot tones. SIA opposes Aloha Networks' proposal for a separate pilot tone, which Aloha Networks claims would facilitate installation, and opposes its related proposal for automatic monitoring of received signal strength in certain VSAT systems, without pilot tones, by using the downstream signal. Network operators already have an effective installation method, using a "cross-pol" check, thus, requiring a pilot tone for installation purposes is unnecessary and would be burdensome to VSAT network operators. In addition, as demonstrated in SIA's initial comments, pilot tones are complex and costly, would duplicate functions already performed by a VSAT system's outroute signal, and would reduce the overall spectrum efficiency of VSAT networks. Similarly, a monitoring regime based on the downstream signal would have negative ramifications for VSAT operations.

Professional installation. SIA opposes both the professional installation requirement proposed by the Commission and the modified professional installation requirement proposed by Aloha Networks. Rather than adopting these mechanistic and overly-regulatory proposals, the

Commission should continue its policy of requiring professional installation as a license condition on a case-by-case basis. That policy maximizes flexibility for licensees and the Commission.

Earth Station Antenna Gain Pattern Envelope. SIA opposes the proposal by Spacenet/Starband to apply the same off-axis angle compliance standards to Ku-band systems and Ka-band systems. The Commission already has developed compliance standards for Ka-band systems, and any extension of proposed new rules to the Ka-band is unnecessary.

I. THE COMMISSION SHOULD ADOPT SIA'S PROPOSAL FOR ROUTINE LICENSING OF C-BAND ANTENNAS AS SMALL AS 2.4 METERS

In its Comments,[3] the SIA proposed that the Commission modify Section 25.212(d)(2) to routinely license antennas having dimensions in the GSO plane as small as 2.4 meters, in the conventional C-band, for (i) narrowband analog carriers up to 200 kHz wide, provided that the maximum power spectral density into the antenna flange does not exceed –12 dB(W/4kHz) and (ii) digital carriers, provided that the maximum power spectral density into the antenna flange does not exceed –12-10log(N) dB(W/4kHz).[4] In addition, under SIA's proposal, applicants for 2.4-meter antenna licenses would be required to achieve antenna pointing accuracy, toward the desired satellite, within ±0.5º, to prevent unacceptable interference into adjacent satellites. Further, the SIA proposed that eligibility for routine licensing should be determined using the antenna gain pattern rule rather than the antenna diameter itself, *i.e.*, the transmit antenna gain envelope starting angle shall be less than 1.7 degrees as specified in the SIA proposal for Section

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[3] *See* SIA Comments at 4.

[4] Where, in proposed Section 25.212(d)(1), N is defined as:

> In the 6 GHz band, an earth station with an antenna dimension of 4.5 meters or greater in the geostationary satellite orbital plane may be routinely licensed for transmission of SCPC services if the maximum input power spectral densities into the antenna flange do not exceed + 0.5 dB(W/4kHz) for analog SCPC carriers with bandwidths up to 200 kHz and do not exceed –2.7 – 10log(N) dB (W/4kHz) for digital carriers.
> (i) For digital transmissions using frequency division multiple access (FDMA) or time division multiple access (TDMA) technique, N is equal to one.

25.209(a)(4). Any antennas that do not meet this antenna pattern starting angle criteria will be considered non-routine, and coordination of such operation by the target satellite operator with adjacent satellite operators will be required. Finally, the SIA proposed that these smaller C-band antennas would only be afforded downlink protection to the extent specified in Section 25.209(c).

GCI, on the other hand, proposed to reduce the size of C-band antennas that may be routinely licensed only to 3.7 meters in diameter, rather than 2.4 meters. SIA opposes this proposal as overly conservative because it would only increase marginally the number of C-band antenna applications that could be routinely licensed, and would not accommodate adequately the continuing migration to digital operations at C-band.

In its Comments, GCI presented reasons why it does not support routine licensing of 2.7-meter C-band antennas.[5] GCI's arguments, however, are based on inaccurate information, as outlined below:

- GCI relied on an under-performing 2.7 m antenna with a pattern that has an unusually high first sidelobe peak of 3 dB above that permitted under Section 25.209. Attached to these Reply Comments as Figure 1 is a chart showing a typical C-band antenna pattern for 2.4 m antennas, operating at 6 GHz, that are readily available in the marketplace today. This pattern clearly shows that the first sidelobe peak is well below the 29-25log(theta) envelope.

- GCI described potential uplink interference from small antennas into its typical transmissions (*i.e.*, 16QAM carrier with a ¾ rate FEC and Reed-Solomon coding). In its comments, GCI proposed that 2.7 m antennas could support digital SCPC services, provided that they were operated with 3 dB, or more, of Output Backoff (OBO) from saturation. The concept of OBO to specify lower power level into a transmit earth station antenna is dependent upon the characteristics of a particular spacecraft and individual transponders, and is inappropriate when establishing earth station licensing criteria. Thus, SIA opposes GCI's proposal to use the concept of OBO to specify lower power level into a transmit earth station antenna. SIA's proposal, to specify earth station transmit power spectral density limits, is appropriate and is independent

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(ii) For digital transmissions using code division multiple access (CDMA) technique, N is the maximum number of co-frequency simultaneously transmitting earth stations in the same satellite receiving beam.

5 *See* GCI Comments at 4.

of satellite and transponder operating characteristics. This requirement would be applicable to all digital transmissions and would be consistent with Commission precedent.

II. THE COMMISSION SHOULD NOT ADOPT REGULATIONS GOVERNING CONTENTION PROTOCOLS

The SIA demonstrated in its initial comments that there is no need for the Commission to adopt regulations regarding contention protocols for FDMA, TDMA or CDMA. As stated in the SIA's Comments, it is unnecessary to impose a power reduction requirement for Aloha access techniques.[6] Hundreds of thousands of VSAT terminals using Aloha access have been deployed over the last twenty years without causing harmful interference to adjacent satellite systems. In fact, as the number of terminals increases, there have been no corresponding incidents of harmful interference.[7]

Aloha Networks claims that adjacent satellite interference will "undoubtedly" increase in the future as consumer-oriented Internet access VSAT systems "emerge."[8] Aloha Networks' claim has absolutely no basis in fact. Consumer-oriented Internet access VSAT systems have *already* "emerged," and have been in the marketplace since 2000. The number of VSAT systems providing both consumers and businesses with Internet access already is in the hundreds of thousands. Contrary to Aloha Networks' unsubstantiated claim, the significant growth in VSAT systems providing Internet service has not resulted in harmful interference to adjacent satellite systems. Moreover, Aloha Networks provides no evidence to demonstrate that any additional growth in these systems will cause harmful interference to adjacent satellite systems.

The SIA observed in its Comments that the Commission is concerned with the possibility of harmful interference to adjacent satellite systems and proposed the adoption of regulations regarding the use of contention protocol systems. The SIA does not support the adoption of regulations to address an issue that does not yet exist (and, with advances in satellite technology,

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6 *See* SIA Comments at 18.

7 *See* Spacenet/Starband Comments at 6 ("As VSAT networks have rapidly expanded, particularly during the past decade, there have been no reported incidents of harmful or unacceptable interference caused by the random access techniques . . . .").

8 Aloha Networks Comments at 1-2.

may never materialize). However, should the Commission proceed to impose regulations governing contention protocols, the SIA proposed the following modification that could replace parts (i), (ii) and (iii) of the rules proposed by the Commission in paragraph 90 of the FNPRM:[9]

> The maximum transmitter power spectral density of a digital modulated carrier into any GSO FSS earth station shall not exceed –14-10log(N) dB(W/4kHz), where N is an integer. The number N is defined such that, during any 100 millisecond interval, the probability that Q>N*100 milliseconds is less than 0.01, where Q = the accumulated transmission time of all co-frequency simultaneously transmitting earth stations in the same satellite receiving beam. The maximum duration of any single collision is less than 100 milliseconds.

As discussed in the SIA's Comments, this alternative conforms to the Commission's determination that the probability of collision in a VSAT network with 100 millisecond transmissions should be limited to less than 1 percent. As in the Commission's proposal, the offered load in a network with 100 millisecond transmissions would be controlled so that the probability of collision between any two transmissions is less than 1 percent. However, the SIA alternative allows additional flexibility for systems with bursts of duration less than 100 milliseconds. Different VSAT networks are designed with different fundamental transmission durations. A VSAT network with shorter duration transmissions will create shorter duration collisions. These shorter duration collisions will not have the same effect as a collision between two 100 millisecond bursts. Thus, the offered load in a network with shorter duration collisions would not need to be as restricted as a network with longer duration collisions.

The SIA alternative is designed to provide and maintain a viable service for networks with shorter duration collisions and will not cause any increase in interference to adjacent satellite networks. Moreover, without the additional flexibility provided in the SIA alternative, VSAT networks using shorter transmission times would be disadvantaged relative to networks using longer transmission times. The SIA alternative addresses the differences between VSAT networks and provides a technology neutral solution. The SIA continues to maintain its position

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[9] *See* SIA Comments at 18-20. The Commission could insert the rule revision proposed by the SIA

that the Commission should not adopt regulations governing contention protocols and has proposed this alternative only in the event the Commission imposes such regulations.

In contrast, Aloha Networks' proposal further restricts the offered load in a network through a reduction in either the probability of collisions or the duration of transmissions.[10] This proposal is unnecessary and unwarranted. As discussed above, the SIA strongly believes that there is no need for any regulation regarding random access techniques. There have been no demonstrated cases of harmful interference to adjacent satellite networks attributable to random access techniques. Yet, Aloha Networks mistakenly believes that, if any regulation is adopted, such regulation should be as restrictive as possible without providing any basis for the additional restrictions. Aloha Networks has not provided any evidence to support its proposal to reduce either the probability of collisions or the duration of transmissions by an arbitrary factor of ten. The Commission should not adopt the unsubstantiated proposal of Aloha Networks.

The Commission also should not adopt the proposal of Qualcomm. Contrary to Qualcomm's assertions, its statistical approach is not technology neutral.[11] The Qualcomm proposal is applicable only to contention protocol CDMA systems. The proposal would not be applicable to reservation type systems such as TDMA, FDMA, and non-random access CDMA. For example, TDMA uses narrow bandwidth on multiple shared carriers whereas contention protocol CDMA systems operate over the entire bandwidth. Thus, the application of statistical techniques to the relatively few random access channels in a TDMA network will permit transmission collisions only on these few channels. In contrast, the application of statistical techniques to networks using contention protocol CDMA systems will permit transmission collisions over the entire bandwidth. The Qualcomm proposal would place TDMA, FDMA, and non-random access CDMA systems at a disadvantage to contention protocol CDMA systems.

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in its comments under Section 25.134(a)(1)(iii).

[10] *See* Aloha Networks Comments at 2, 4.

[11] *See* Qualcomm Comments at 3.

Moreover, Qualcomm's proposal does not include a time limit such as the 100 millisecond duration proposed in both the Commission's proposal and the SIA's alternative (in the event the Commission should impose regulations) for TDMA systems using contention protocols. Thus, under the Qualcomm statistical approach, a contention protocol CDMA system would permit transmission collisions over the entire bandwidth for an unlimited duration.

The SIA also opposes Qualcomm's proposal to extend any regulations adopted regarding contention protocols to the Ka-band.[12] As stated in the SIA Comments, the first Ka-band satellites are expected to be launched only this year. Thus, it is premature to layer any additional regulations on the operation of these nascent networks without any basis for the new regulations.[13] As the Commission stated in the FNPRM, given the current state of development of Ka-band VSAT systems and the relative volume of traffic compared to Ku-band VSAT systems, the Commission is not concerned about the effect of contention protocol random access techniques on Ka-band VSAT transmissions.[14] The SIA agrees with the Commission's determination that if any regulations are adopted regarding contention protocols, those regulations should not be extended to the Ka-band.[15] For all of the foregoing reasons, the Commission should not adopt the proposal of Qualcomm.

As stated above, the SIA does not support the adoption of regulations governing contention protocols and has proposed an alternative modification to the Commission's proposal only in the event the Commission proceeds to impose such regulations. Should the Commission pursue regulation, then the graduated approach proposed by Spacenet/Starband, with certain modifications, could (like the SIA alternative) provide additional flexibility to the VSAT network operator as compared to the Commission's proposal.[16] However, the SIA would modify the Spacenet/Starband proposal such that the probability of transmission collisions is averaged over 100 milliseconds, as in the SIA alternative. Otherwise, as described above, VSAT

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12 *See id*. at 2, 4.

13 *See* SIA Comments at 20.

14 FNPRM ¶103.

15 *See* FNRPM at ¶103.

16 *See* Spacenet/StarBand Comments at 17-20.

networks using shorter transmission times would be disadvantaged relative to networks using longer transmission times.

As noted in the SIA's Comments, if the Commission adopts regulations regarding contention protocols, the SIA recommends that the Commission accept a certification from the earth station applicant certifying that the applicant satisfies the new regulations.[17] The SIA does not support the Commission's proposal to supply a technical showing with detailed probability calculations.[18] A technical showing supplied with each earth station application would place a significant burden on the applicant to prepare and on the Commission to review. Instead, a new question box could be included on the Form 312 to permit the applicant to certify that it is complying with the new regulations.

III. THE COMMISSION SHOULD NOT REQUIRE SEPARATE PILOT TONES

The SIA strongly opposes the adoption of any Commission-imposed requirement to implement separate and unique pilot tones.[19] Any such requirement would be redundant and thus unnecessary, prohibitively complex and costly on network operators with small terminals, and spectrally inefficient. As discussed in the SIA's Comments, in a typical VSAT network, there is already a broadcast transmission from the hub earth station that is received continuously by all terminals in the network in order to synchronize these terminals with the network timing and bring them under positive control of the hub earth station. Through the VSAT terminal design, this outroute transmission must be successfully received by a terminal before it can transmit. Under the current deployment of VSAT networks, the remote terminals cease transmission when they no longer receive the outroute signal. As such, this outroute signal is already serving the purpose of a pilot tone. Thus, imposing a requirement for an independent pilot tone in each network would unnecessarily increase the complexity and cost of VSAT network implementation, would result in a consequential and costly requirement to redesign existing VSAT terminals, and would reduce the overall spectrum efficiency of these networks.

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17 *See* SIA Comments at 19-20.

18 *See* FNPRM at ¶93.

19 *See* SIA Comments at 13-14.

Aloha Networks states that for certain VSAT systems, "automatic monitoring of received signal strength could be accomplished without the aid of pilot tones." For such networks, Aloha Networks states that "it should be relatively easy to implement a received signal strength monitoring function, using the downstream DVB signal."[20] Contrary to Aloha Networks' claim, implementation of such monitoring would have significant negative economic, operational, and design ramifications for such systems and hence would not be "relatively easy" to implement.[21] Aloha Networks also asserts that for larger networks, the use of a separate pilot tone at a different frequency on each polarization would facilitate installation. Again contrary to Aloha Networks' claim, the use of a separate pilot tone would not facilitate installation. As discussed in the SIA's Comments, VSAT network operators already have an effective installation method to minimize the potential for adjacent satellite interference.[22] During the antenna installation process, the VSAT antenna transmit cross-polarization gain is measured by the hub earth station and minimized to align the null with the desired satellite and polarization. This installation method is effectively used for both large and small networks to minimize the potential for adjacent satellite interference. Thus, Aloha Networks' proposals are unnecessary, would be burdensome to VSAT network operators, and would increase the cost of VSAT network installation and implementation. SIA strongly opposes the adoption of any regulation regarding separate pilot tones and urges the Commission not to adopt the proposals of Aloha Networks.

IV. THE COMMISSION SHOULD NOT ADOPT A PROFESSIONAL INSTALLATION REQUIREMENT

The SIA strongly recommends that the Commission not adopt a professional installation requirement for Ku-band antennas less than 1.2 meters in diameter and C-band antennas less

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20 Aloha Networks Comments at 7.

21 Similar to the proposal to implement a separate pilot tone, Aloha Networks' monitoring proposal would unnecessarily increase the complexity and cost of VSAT network implementation and operation. Moreover, DVB is only one of several types of signal protocols.

22 *See* SIA Comments at 14.

than 4.5 or 3.7 meters in diameter.[23] As discussed in the SIA's Comments, where the Commission believes that it is warranted for any of its public interest determinations, it includes a professional installation requirement as a condition of license for certain types of earth stations. This has proven effective over the last three years that these terminals have been licensed and deployed throughout the United States.

The "professional installation" condition is implemented by individual licensees through their proprietary operational and commercial procedures. Some, if not all, licensees already have training programs that are required for all authorized installers. Ultimately, the licensee has considerable incentive to ensure that antennas are pointed and mounted properly in order to provide the best quality of service possible. The measurement equipment and techniques for installing different companies' equipment will naturally vary and cannot be effectively or responsively regulated. These different techniques and equipment still accomplish the regulatory goals provided by the license condition, while fostering technological innovation that may in the future convince the Commission that such a condition would not be necessary with certain types of equipment. For all of the foregoing reasons, the SIA does not support the adoption of a professional installation requirement as proposed by the Commission, or with the modifications proposed by Aloha Networks.[24]

V. THE COMMISSION SHOULD NOT APPLY KU-BAND OFF-AXIS ANGLE ANTENNA STANDARDS TO KA-BAND SATELLITE SYSTEMS

SIA opposes the Spacenet/Starband proposal to treat Ka-band and Ku-band systems equally in terms of off-axis angle compliance.[25] Section 25.138 of the Commission's Rules already provides appropriate service rules for the Ka-band, and any extension of proposed new rules to the Ka-band is unnecessary. Thus, the Spacenet/Starband off-axis angle proposal presented for Ku-band submeter antennas should not be applied to the Ka-band.

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23 *See id*. at 14-15.

24 *See* Aloha Networks Comments at 8-10.

25 Spacenet/Starband Comments at 7 n.7.

CONCLUSION

For the reasons stated herein and in its initial comments, SIA respectfully requests that the Commission revise Part 25 of its rules in the manner that SIA has proposed.

Respectfully submitted,

SATELLITE INDUSTRY ASSOCIATION

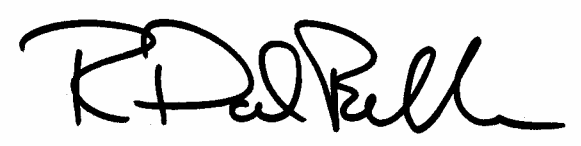

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Figure 1

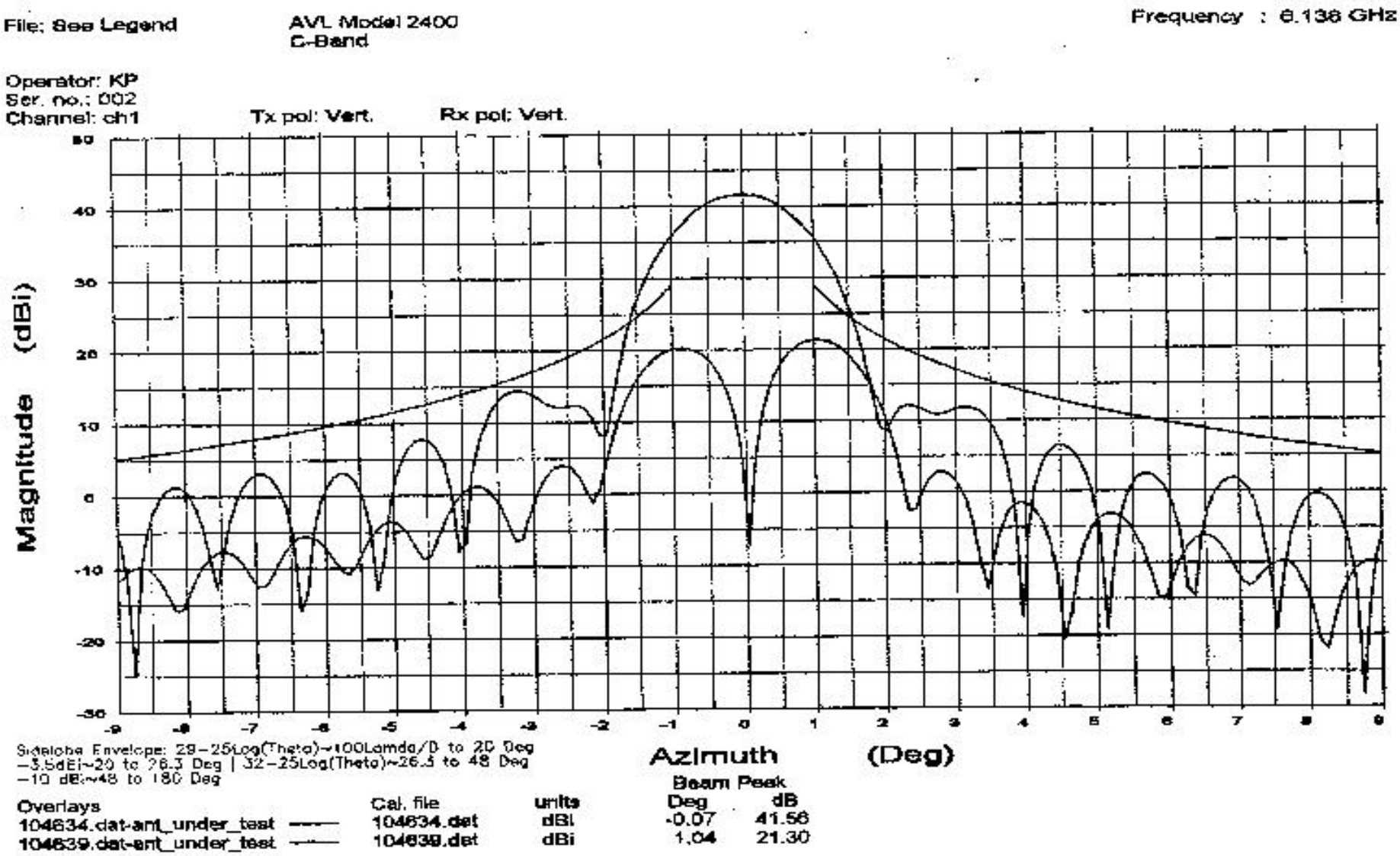

Figure 1. Typical 2.4 m Antenna Pattern at 6 GHz